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Rhodora

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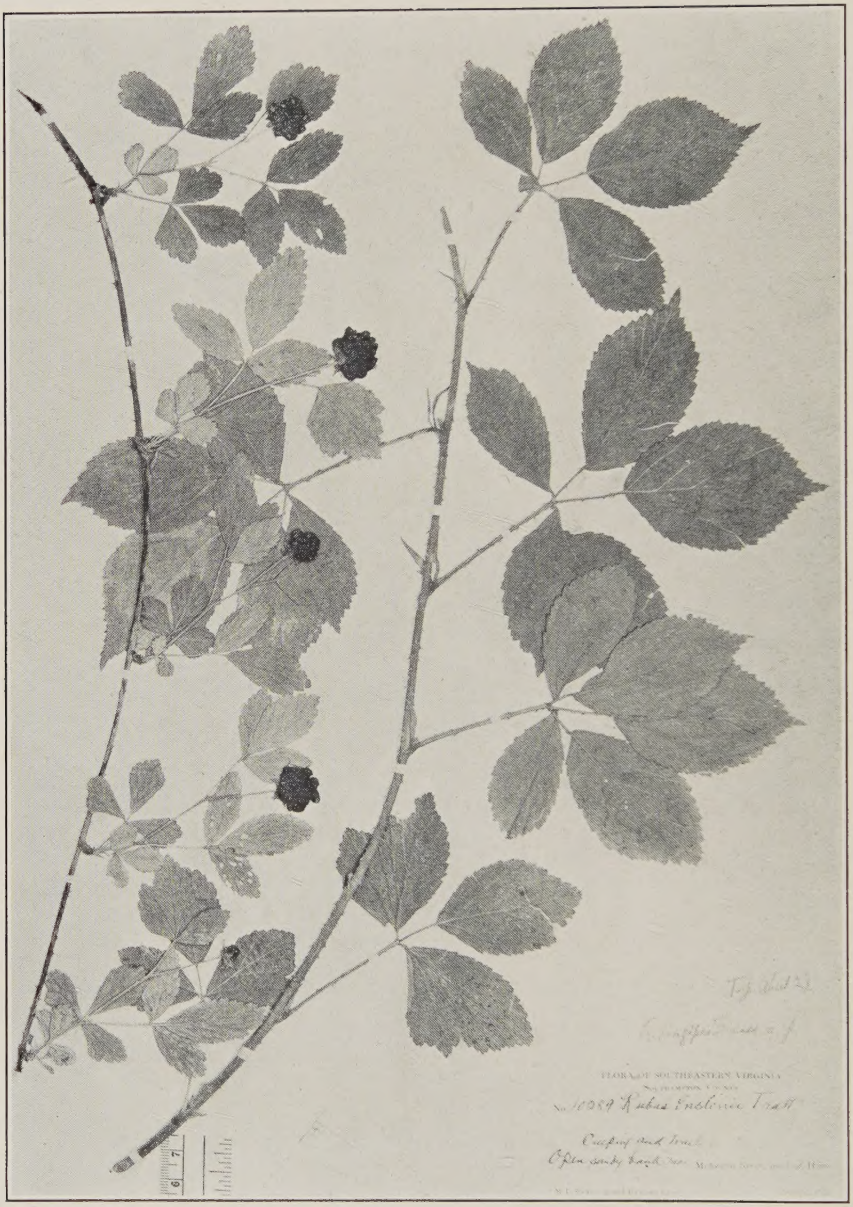

Photo. B. G. Schubert

RUBUS LONGIPES: one of TYPE-SHEETS, × 2/5.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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A SMALL GATHERING OF BLACKBERRIES

M. L. Fernald

(Plates 1093–1096)

In attempting to make a possibly usable treatment of *Rubus*, subg. *Eubatus* Focke, the Blackberries, I have succeeded in preparing a treatment of the trailing and root-tipping sections, a most difficult task in view of the very contradictory statements or illustrations in the original accounts or in discussions of the species. Nevertheless, in this rather thankless and baffling study a few plants have come to light which seem to need description or realignment. These are proposed below. It has, of course, been imperative constantly to lean on the voluminous writings on the group of the always prolific Bailey in his Gentes Herbarum. With full respect for four-score-and-ten and with the affection one feels for a student of unequaled energy, it is regrettable to find that his recent publications show too many evidences of haste and lack of careful checking. A few puzzling cases noted below show the utter perplexity into which the interpreter is led.

In their *Blackberries of New England*, Vt. Agr. Expt. Sta. Bull. 217: 78 (1920), Brainerd & Peitersen gave, as Plate XXXVI, an illustration (× 8/11) of a supposed hybrid *Rubus* with canes shown as bearing hooked prickles 2.7–3.6 mm. long; the terminal primocane-leaflet narrowly ovate and tapering gradually to a long acumination, the leaflet two thirds as broad as long; the flowering shoot prickly; the lowest pedicel (about 4.5 cm. long) subtended by a dilated and long-petioled leafy bract 3–3.4 cm.

broad; pedicels glabrous; calyx reflexed, its lobes very short-tipped and much shorter than the large (1 cm. or more thick) fruit with 20 or more plump drupelets. In Gent. Herb. vii. 306 and 307, fig. 119 (1947) the Brainerd & Peitersen plate is cited as that of the newly proposed *R. jactus* Bailey: "This plant is figured by Brainerd and Peitersen . . . in Plate xxxvi". But how completely different are the new illustration (Bailey's fig. 119) and his description: *R. jactus* with "Primocanes . . . nearly nude but bearing a very few minute prickles 1–2 [instead of stoutish and 2.7–3.6] mm. long that readily rub off", the canes, as drawn, suggesting pencils or macaroni; terminal primocane-leaflet subrotund-ovate (four-fifths as broad as long) and abruptly tipped; the flowering shoot prickleless except at summit; the glandular pedicels (up to only 3 cm. long) all illustrated as subtended by small stipule-like bracts at most 8 mm. broad (although the English text says "axillary pedicels each . . . subtended by a conspicuous broad bract, nearly or quite equalling the foliage"); calyx-lobes erect and much overtopping the tiny fruit, with conspicuous slender appendages, illustrated as nearly as long as the lanceolate blade (although the Latin description says "calycis lobi lati . . . non valde extenti"). What does one do; take into account the plate of Brainerd & Peitersen (technically it should be disregarded), follow the description, which as to several characters contradicts the seemingly accurate new figure, or follow the new illustration? Technically the type-specimen must settle the matter but when one is working against time to cover the whole vascular flora (perhaps 7000–8000 nos.) of a large area he can not take out the months necessary for careful study of types not at hand—especially with the constant dread of hundreds of other hastily published clonic species.

As the type of *Rubus flagellaris* Willd. there is shown in Gent. Herb. v. fig. 99 on p. 245 (1943) a drawing of a plant so named in the Willdenow Herbarium. This has the larger simple bracteal leaves of the inflorescence very broadly ovate to oblate or subreniform, the terminal leaflet of the primocane-leaf short-tipped and with nearly cuneate base, the pedicels forking. But as nearest matching it we are shown (fig. 100 on p. 248) a simple bracteal leaf much longer than broad and terminal primocane-leaflets long-acuminate and with rounded-cordate bases. Far-

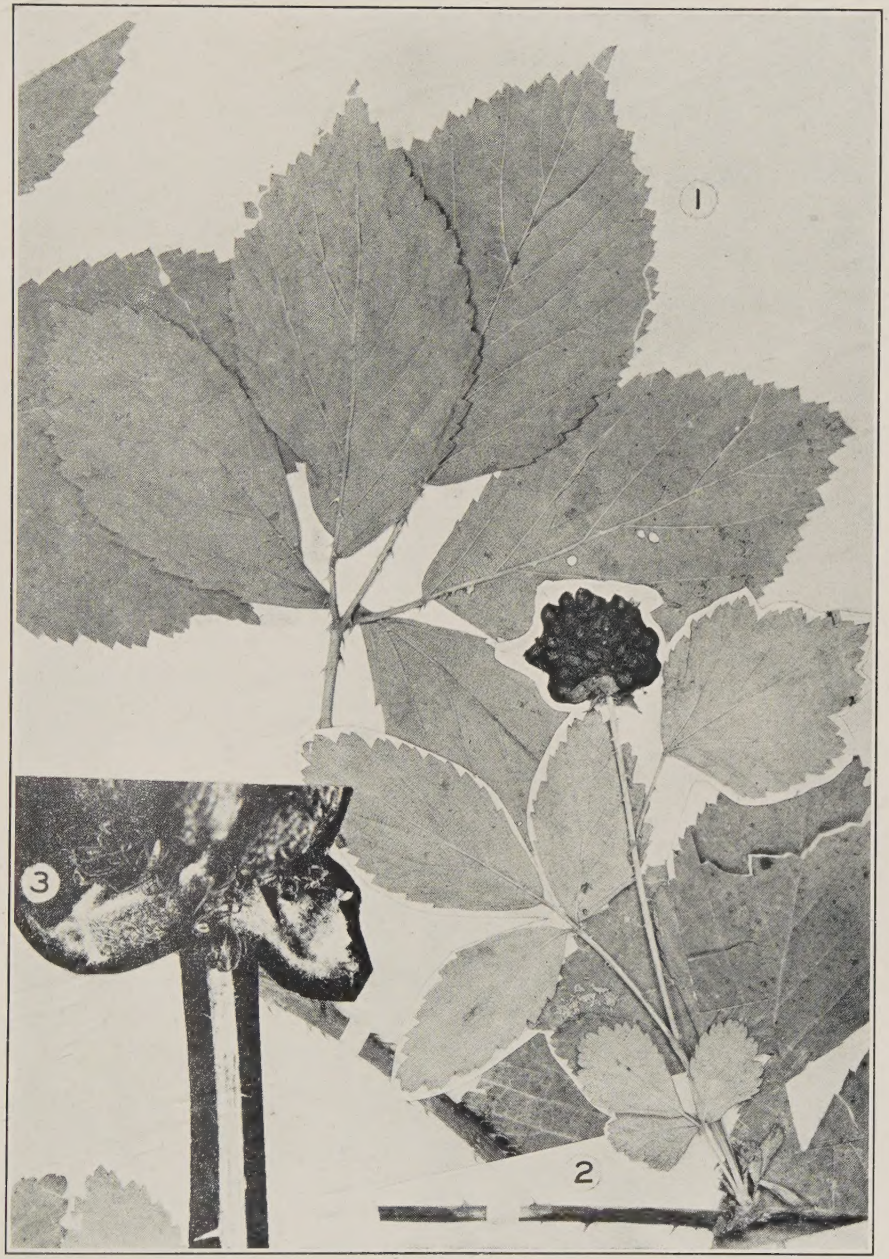

Photo. B. G. Schubert

RUBUS LONGIPES (all FIGS. from TYPE): FIG. 1, portion of primocane and leaf, × 1; FIG. 2, short fruiting branchlet, × 1; FIG. 3, pedicel and fruiting calyx, × 10.

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ther on (fig. 111) "a very distinct species in Massachusetts", *R. felix* Bailey, is shown with bracts highly suggestive of the Willdenow specimen; and surely *R. maniseesensis* Bailey, l. c. vii. 268, 269 (fig. 95) from Rhode Island is pretty close to the Willdenow specimen, as well as to the illustration of *R. felix*. Since dewberries with just such broad bracts occur from Massachusetts, Rhode Island and Connecticut to southeastern Virginia, to one who can not now settle the question the designation of two "new species" to cover them does not seem wholly felicitous.

Another reputed ally of the problematic *Rubus flagellaris* is *R. eflagellaris* Bailey, l. c. 262, 263, fig. 91 (1947), "probably to be keyed with the *flagellaris* group rather than with the glandiferous section (page 242, Gent. Herb. v) but to be mentioned in the latter". *R. eflagellaris* is shown in a very clear drawing as having 4 or 5 short and spreading-ascending "glandiferous pedicels" (descr., p. 262) 1.5–3 cm. long and diverging from a prolonged axis; while *R. flagellaris* sensu Bailey is described, l. c. v. 244 (1943) as "glandless throughout" and with "inflorescence ascendate", the almost erect glandless pedicels shown in fig. 100 as 4–6.3 cm. long. If, therefore, Bailey's groupings in his key to the *Flagellares* mean anything (and they certainly do), the newly proposed *R. eflagellaris* does not belong in his "§ I. . . . *Plant without gland-tipped hairs or long pinhead glands on . . . pedicels or calyx*" nor under "*+Florescence.—Inflorescence . . . of the simple ascendate order or reduced to a single upright pedicel.* . . . cluster lacking a continuing central rachis", this leading to his *R. flagellaris*. In other words, the "continuing central rachis" (illustrated as 5 or 6 cm. long) and the other characters shown would seem to place *R. eflagellaris* in Bailey's §II. (p. 242), "*++Florescence.—Flowers and fruits in more or less definite cymiform or racemiform clusters*, many or most of the pedicels short and flaring or divaricate . . . from the central rachis; glands only on pedicels and calyx" (p. 243) and not too far from *R. Grimesii* Bailey (discussed under the new *R. imperiorum* below) and *R. particeps* Bailey. The student who tries to visualize *R. eflagellaris* as "probably to be keyed with the *flagellaris* group rather than with the glandiferous section" is bound to go astray.

Many other such seeming contradictions form perpetual

stumbling-blocks to ready interpretation, but only three others need here be noted. *Rubus obvius* Bailey, l. c. v. 359 (fig. 159) and 360 (1943) is described with primocane-leaflets "more than one-half as broad" as long; yet the illustration shows the terminal leaflet of the uppermost expanded leaf 4 cm. long and only about 1.5 cm. broad. Does one follow the description or the illustration? In vol. v. 71 (1941) the first species keyed under "EE. Axis of primocanes conspicuously glandular-hairy" is "22. R. vigil". Nevertheless, turning to the description of *R. vigil* (p. 86) one reads: "Canes hard and woody, glandless" and the beautiful illustration (fig. 29) so shows them!

Lastly, if foliage-characters mean so much that every slight divergence in outline, number of trichomes, toothing, etc. always means a "new species", look at the original plate (not cited in Gent. Herb. v. 254) of *R. canadensis*, var. *roribaccus* Bailey in Am. Gard. xi. 642, with plate as frontispiece (1890), then look at fig. 102 in Gent. Herb. l. c. (nearly like the original plate, with the bracteal leaves or leaflets narrow and much longer than broad). Then turn over to fig. 103, also called *R. roribaccus*, with broadly cordate-ovate bracts. If these are all one species, simply modified by transplanting, are not 90% of recent propositions open to serious doubt as to their fundamental or stable characters? Perhaps not; it is more probable that the cordate-bracted plant is not *R. roribaccus*.

Rubus trifrons Blanchard, var. **pudens** (Bailey), stat. nov. *R. pudens* Bailey, Gent. Herb. v^2. 78, fig. 26 (1941).

The large series of *Rubus trifrons* which has been assembled in the Gray Herbarium and the herbarium of the New England Botanical Club shows typical *R. trifrons*, with the primocanes copiously bristly, to pass into *R. pudens*, in which the primocanes are essentially smooth or with only few scattered bristles. In the most typical *R. trifrons* the petioles of the primocane-leaves are rather copiously bristly, in the illustration of *R. pudens* shown as nearly bristleless. Both series show too much integradation over their broad range, but the more typical and more bristly-caned *R. trifrons* is usually coarser than var. *pudens*, the former ranging from middle Nova Scotia and southern New Brunswick to eastern Ontario, eastern New York and Connecticut, while the smoother-caned and usually more slender var.

pudens extends eastward to Cape Breton Island but, so far as the material shows, does not extend west of the Connecticut Valley in Vermont, with its southwestern limit on Cape Cod. *R. trifrons* (frequently 5-foliolate) varies, as do most species, in the size and outline of leaflets. The terminal primocane-leaflet may be obovate, elliptic or ovate, without any apparent constant difference in the smoothish calyx-lobes, which range from 3.5–5 mm. long, and the small petals, mostly 5–9 mm. long and 2.5–4 mm. broad. I find myself unable, therefore, to maintain *R. alter* Bailey, l. c. 82, fig. 28 and *R. harmonicus* Bailey, l. c. 86, fig. 30. All of these plants differ from *R. hispidus* Michx. in their less coriacceous and scarcely lustrous deciduous leaves, with the leaflets not so blunt and having sharper toothing. Brainerd's contention that *R. trifrons* arose through crossing of *R. hispidus* with a member of § *Setosi* was wholly reasonable. The coarser and more bristly extreme parallels typical *R. hispidus* L., the more slender and nearly smooth-caned plant simulating *R. hispidus*, var. *obovalis* (Michx.) Fernald.

Rubus (§ Flagellares) **longipes,** sp. nov. (tab. 1093 et 1094), a *R. particulare* differt primocannae aculeis unguiculatis; primocannae foliis subtus glabrescentibus quinatis; petiolo valde armato aculeis unguiculatis recurvatis; foliolis ellipticis vel elliptico-obovatis dentato-serratis acuminatis foliolo terminali 6–7 cm. longo 4 cm. lato basi sensim rotundato petiolulo glabrato 1.7–2.5 cm. longo, foliolis mediis petiolulatis petiolulo 1–1.5 cm. longo; stipulis lanceolato-linearibus 1.5–2 cm. longis; floricannis subsimplicibus remote unguiculato-aculeatis; floricannae foliis ternatis, foliolis plerumque angusto-obovatis obtusis; flore 1 bractea ternata vel simplici; pedicello recto 1.5–3.5 cm. longo divergenter villoso deinde glabrato.—Southeastern Virginia: open sandy bank near Meherrin River, south of Hugo, June 13, 1939, *Fernald & Long*, no. 10,289, distrib. as *R. Enslenii* Tratt. (type in Herb. Gray.; isotype in Herb. Phil. Acad.).

Rubus longipes belongs in the usually 1-flowered series typified by *R. Enslenii* Tratt. In the latter species and the commoner and coarser *R. Baileyanus* Britton, both frequent in eastern Virginia, the pedicels and petioles, at least of flowering material, are merely appressed-pilose or glabrescent, usually without glands. The other eastern Virginian species of the series, *R. scambens* Bailey and *R. leviculus* Bailey, have the young (usually

the mature) pedicels and petioles spreading-villous and usually with stipitate glands and their mostly 3-foliolate primocane-leaves have the paired lower leaflets subsessile, *R. scambens* common, *R. leviculus* found chiefly on bottoms or slopes of the Meherrin River system. The other two species with divergent villi on pedicels and petioles which I am able to recognize in the manual-range are *R. particularis* Bailey, Gent. Herb. vii. 291, fig. 110 (1947) and the newly proposed *R. longipes*, in both of which the primocane-leaves are mostly 5-foliolate, with the upper pair of leaflets on definite petiolules. *R. particularis* of upland West Virginia has the petioles, axes of flowering shoots and pedicels densely spreading-villous but glandless, the leaves velvety beneath, and the single flowers on pedicels only 1–1.5 cm. long. *R. longipes* (for the elongate petiolules) is promptly glabrate throughout, although the fruiting pedicels rarely retain traces of long villosity and stipitate glands; its stipules are broader and longer than indicated in the illustration of *R. particularis* and the fruiting pedicels are up to 3.5 cm. long. On the lower Meherrin it is not far from the northern extension from eastern South Carolina of the extremely slender, almost herbaceous and merely short-bristly *R. leviculus*, with which it can hardly be confused.

Rubus (§ Flagellares) **imperiorum,** sp. nov. (tab. 1095 et 1096), primocannis adscendentibus deinde prostratis angulatis glabris remote aculeatis, aculeis deltoideo-subulatis 3.5–4.5 mm. longis; primocannae foliis plerumque quinatis subtus molliter pilosis supra adpresso-pilosis; petiolo remote unguiculato-armato; foliolis caudato-acuminatis argute duplicato-dentatis, dentibus plerumque 3–5 mm. longis basin versus 3–5 mm. latis; foliolo terminali rotundato-ovato subcordato 10–11 cm. longo 7–8.5 cm. lato, petiolulo 3–3.5 cm. longo sparse piloso, foliolis mediis vix minoribus oblique ellipticis; ramulis floriferis sparse villosis subremote armatis; floricannae foliolis plerumque lobulato-dentatis dentibus obtusis 3–7 mm. longis 4–6 mm. latis, foliolo terminali et bracteis simplicibus late rhomboideis; corymbo folioso (2–) 3–8-floris; pedicellis villosis adscendentibus vel patentibus plerumque 1–3.5 cm. longis remote armatis; calycis tomentulosis inarmatis segmentis ovalibus; petalis 1.2 cm. longis 0.8 cm. latis; fructibus 1.2 cm. diametro.—Virginia: in grass at edge of pine-woods 1½ miles east of Williamsburg, April 17 (*fl.*) and June 11 (*fr.*), 1921, *E. J. Grimes*, no. 3442 (type, 4 sheets, in Herb. Gray.).

Photo. B. G. Schubert

RUBUS IMPERIORUM: portion of floricane, × 1, from TYPE.

Photo. B. G. Schubert

RUBUS IMPERIORUM (both FIGS. from TYPE): FIG. 1, portion of primocane-leaf, × 1; FIG. 2, fruiting summit, × 1.

The fine series constituting the type of *Rubus imperiorum* (of the Dominions) was identified by Bailey as *R. Baileyanus* Britton, as was the material of some other now clearly recognized species. It has little relation to *R. Baileyanus*, which belongs to the *Enslenii*-series with predominantly 1–flowered fertile branchlets, cord-like rather flexible canes, primocane-leaves glabrescent beneath, the margins sharply serrate, the terminal petiolule 0.5–2 cm. long; flower usually solitary (rarely 2 or 3) on an erect minutely puberulent to glabrous pedicel up to 7 cm. long. *R. imperiorum* is wholly different: a coarser plant with strong ligneous canes; leaves velvety beneath, with broad and coarse dentation or even rounded-lobulate; the terminal primocane-leaflet on a spreading-villous petiolule 3–3.5 cm. long; the definite corymb with mostly 3–8 flowers on arched-ascending to divergent villous pedicels at most 3.5 cm. long. In the broad and low lobulate dentation *R. imperiorum* seems unique among the species of § *Flagellares* with arcuate-ascending to divergent short pedicels and leaves subvelutinous beneath. *R. Grimesii* Bailey, which it somewhat approaches, has much narrower and sharply serrate primocane-leaflets and the pedicels bear numerous fine prickles and glands, while *R. cordifrons* Bailey, common in southeastern Virginia, although with somewhat similar primocane-foliage, has the teeth sharper and narrower, while the toothing of the floricane-leaves is small and sharp. The relationship of *R. imperiorum* is, perhaps, with *R. cordifrons*.

As *R. Grimesii* I am taking *Grimes* no. 3489, collected at the edge of pine-woods ½ mile west of Williamsburg, flowering material April 30, 1921, fruiting material and primocane collected June 18, 1921, this material being in the Gray Herbarium and clearly marked by Professor Bailey "*R. Grimesii* Bailey, n. sp., type. L. H. B.". It was from these sheets that the illustration was prepared for the original publication of the species in Gent. Herb. ii. 331, fig. 158 (1932). The later abandonment of this specified type, Grimes's own material, in Gent. Herb. v. 406 (1943), and the citation there of a specimen which Grimes never saw, "*Bailey 36* (type)", collected by Bailey 9 years after the death of Grimes, does not seem at all justified. It is comparable with other shifts and contradictions which can only

perplex those who try to interpret the most active student of a group already sufficiently involved: *R. depavitus* Gent. Herb. v. 382, fig. 172 (1943) published with a beautiful plate showing a 5-foliolate primocane-leaf and glandular pedicels ("pedicelli longi, erecti, glandulosi"), but in vol. vii. 303, fig. 117 (1947) this species, *R. depavitus*, shown with 3 leaflets and glabrous pedicels, while the original plate, published as typical of *R. depavitus*, now appears as representing a new species with a highly suggestive name, *R. redundans*, l. c. 300, 302, fig. 116 (1947). Again, as "contrasted with *R. particeps* of Nova Scotia" there is presented "a picture of *R. alius*, Fig. 121" in Gent. Herb. vii. 308, 310, fig. 121 (1947), "a clear-cut species of Connecticut and Rhode Island", but the caption under the illustration calls it a "trailer in Nova Scotia". Checking back to the original account of *R. alius* in Gent. Herb. v. 400 (1943) one reads that it grows in "Massachusetts, Connecticut". It may be found in Rhode Island, but what about Nova Scotia, which in one item is indicated as its exclusive area? All of which suggests that, if one is to propose a "new species" for every clone, it would be safer not to cite two collections and to be sure that the illustrations are made from the actual types.

Rubus cordifrons Bailey, forma **pleniflorus,** f. nov., petalis numerosis, flore pleno.—New Jersey: border of dry sandy thicket, 1 mile northeast of Fairview, Gloucester County, June 14, 1924, *Bayard Long*, no. 30,768 (type in Herb. Phil. Acad.).

A beautiful and profusely floriferous double-flowered form, many of the stamens altered to petals, the flowers thus suggesting double-flowered small roses.

A STUDY OF ELYMUS IN MINNESOTA[1]

L. E. Booher and R. M. Tryon, Jr.

A preliminary study of *Elymus* in Minnesota revealed that the present treatments were not entirely satisfactory for our material and therefore a more extended study was undertaken. The present study has, of course, its limitations and problems are raised

[1] Contribution from the Herbarium of the University of Minnesota IX. Field work was supported, in part, by a grant-in-aid from the Graduate School of the University of Minnesota.

that only a monographic study can answer. In general, previous work has been accepted whenever possible to do so.

In measurements of the lengths of the spikes, glumes and lemmas awns, if present, were included unless otherwise stated. Detailed descriptions and measurements of floral parts apply to those taken from near the middle of the spike. The widths of glumes are given at their widest portion and flattened out. Measurements for lemmas, paleas, anthers and grains refer in all cases to those of the first florets. Measurements of all floral parts are based upon boiled material. All specimens cited are in the Herbarium of the University of Minnesota.

We are indebted to Mrs. Agnes Chase, Dr. J. R. Swallen and Dr. B. G. Schubert for information concerning certain specimens and to Dr. J. B. Moyle for information concerning the alkali areas in Minnesota.

a. Lemma-awns, if present, ascending, sometimes somewhat spreading, straight or irregularly flexuous, not curved or recurved, mostly less than 2 cm. long....*b.*

b. Rachis continuous at maturity, not disarticulating, each spikelet disarticulating either above or just below the glumes....*c.*

c. Spikelets disarticulating below the glumes[2], glumes long-lanceolate, distinctly widened above the base, more or less twisted.....*d.* (1. *E. virginicus*).

d. Awns of the glumes 3–6 mm. long; awns of the lemmas 8–16 mm. long; spikes included or exserted....*e.*

e. Spikes included or barely exserted, green; upper surface of the leaves glabrate to scabrous..1a. *E. virginicus* (*typical*).

e. Spikes well exserted, glaucous; upper surface of the leaves villous-hirsute.....1d. *E. virginicus* var. *halophilus.*

d. Awns of the glumes absent or up to 2 mm. long; awns of the lemmas 1–2.5 mm. long; spikes mostly exserted.....1b. *E. virginicus* var. *submuticus.*

c. Spikelets disarticulating above the glumes; glumes setaceous to subsetaceous, scarcely widened above the base, straight....*f.*

f. Lemma-awns more than 15 mm. long.....*g.* (2. *E. villosus*).

g. Lemmas glabrate to hispid on the lower part of the body, hispid to villous on the upper part. 2a. *E. villosus* (*typical*).

g. Lemmas glabrate to puberulent on the lower part of the body, glabrate to short-hispid on the upper part.....2b. *E. villosus* f. *arkansanus.*

f. Lemma-awns less than 2 mm. long 6. *E. cinereus* (excluded species).

b. Rachis disarticulating at maturity, at least in part; a spike-

[2] The place of articulation is easily determined in dried specimens, often even those collected in flower. When the spike or spikelet is broken apart by a teasing needle, it breaks at the same place it would normally disarticulate.

let or spikelet-pair at a node falling with a rachis joint
5. *"E. Macounii"* (*Agropyron trachycaulum* var. *typicum* × *Hordeum jubatum*).

a. Lemma-awns ascending-spreading, many in a single spike curved-divergent or recurved, especially in fruit (straight only before flowering) 1.5–4 cm. long, mostly over 2.5 cm. long. . . . *h.*

h. Glumes equal, narrowly to long-lanceolate, distinctly widened above the base, distinctly 3–6 nerved, 14–35 mm., usually 25–30 mm., long. . . . . 3. *E. canadensis.*

h. Glumes unequal, setaceous, not widened above the base, or subsetaceous or rarely narrowly lanceolate; not evidently nerved to scarcely 3-nerved
4. *E. canadensis* × *Hystrix patula.*

1. Elymus virginicus

1a. E. virginicus L. (typical). *E. striatus* Willd., not of most recent authors.—*Culms* erect; *sheaths* glabrous, commonly overlapping; *blades* flat, slightly scabrous on both surfaces and more so on the under surface and on the margins; *spikes* erect, stiff, with bristly ascending awns, often with 1 to 3 rudimentary spikelets below the inflorescence proper; *rachis-internodes* flattened, scabrous or strigose-haired along margins of upper third and with a few longer coarse hairs at the top; *spikelets* in pairs, 3- to 5-flowered (mostly 4-flowered), rigid and closely appressed against the floral axis; *glumes* stout, more or less twisted, stiff, terete and about one-half as broad at the nonstriate base as near the middle, bowed out, indurated and at maturity markedly yellowed at the base for about 2 mm., glabrous or scabrous to scabrous-hirsute on margins and nerves, with 3–5 strong nerves, awns straight and ascending, scabrous; *lemmas* rounded on the back, margins of upper half often narrowly hyaline, glabrate or scabrous to sparsely hispidulous toward the apex, glabrate below, 5-nerved near the apex, awns straight, ascending, stiff, scabrous; *paleas* blunt and ciliate at the apex and along the upper half of the strong keels at either side.

Dimensions of various organs (all measurements based on 16 specimens):

Culm-length	40–80 cm.	Glume-width	1.0–1.6 mm.
Culm-width	0.1–0.3 cm.	Lemma-length	1.5–2.4 cm.
Blade-length	13–25 cm.	Length of lemma-body	7.0–8.6 mm.
Blade-width	0.3–1.0 cm.	Palea-length	6.6–8.5 mm.
Spike-length	4.5–15.5 cm.	Grain-length	4.5–5.6 mm.
Glume-length	12–20 mm.	Grain-width	1.4–1.8 mm.

In addition to the sixteen specimens included in the above description, the Minnesota collection includes three unusually robust specimens. These three specimens are distinctive only in the size of the various parts which are from 5 to 25% larger than the corresponding organs of the other specimens.

Generally distributed in open woods, river bottoms and on river banks and lake shores.

1b. E. VIRGINICUS var. SUBMUTICUS Hooker.—Differs from the species proper in having subulate-tipped or very short-awned glumes (awns up to 2 mm. long) and lemmas (awns 1–2.5 mm. long) and in having exserted (up to 10 cm.) and/or included or barely exserted spikes. Among eight specimens collected within the state, only one specimen had included spikes exclusively; five had exserted spikes of which two had short-exerted and included spikes represented in the same specimens.

Distribution and habitat similar to that of the typical element of the species.

1c. Specimens intermediate between E. VIRGINICUS (TYPICAL) and E. VIRGINICUS var. SUBMUTICUS. *E. virginicus* f. *jejunus* Ramaley.

After careful examination of available specimens, including the type of *E. virginicus* f. *jejunus*, it is our belief that it and specimens corresponding to it are intermediates between typical *E. virginicus* and var. *submuticus*.

The following table shows the range of the critical characters:

E. virginicus (16 specimens)	*Proposed intermediate group* (5 specimens)	*E. virginicus* var. *submuticus* (8 specimens)
Length of lemma-awns 8–16 mm.	4–12 mm.	1–2.5 mm.
Length of glume-awns 3–6 mm.	Up to 5 mm. or merely subulate-tipped.	Up to 2 mm. or merely subulate-tipped.

SPECIMENS EXAMINED: MINNESOTA: Lake Benton, August 1891, *Sheldon 1375* (TYPE of *E. virginicus* f. *jejunus*); St. Louis River, July 23, 1886, *L. H. Bailey 265;* Gooseberry Falls, Lake Co., August 31, 1930, *Rosendahl 6390;* St. Vincent, August, 1900, *Ballard 2629;* Winona Co., July to October, 1897, *Holzinger 29* (UM Herb. 264292).

1d. E. VIRGINICUS var. HALOPHILUS (Bickn.) Wiegand.—*E. halophilus* Bickn.

Since this variety of *E. virginicus* apparently is not common and has seldom been described in detail, the description of the four specimens collected in Minnesota is given here. This variety differs from the typical species in having usually more flaccid and glaucous spikes, in general shorter paleas, usually less twisted glumes with pale yellow glume-bases, and glaucous leaf-blades which are pubescent on their upper surfaces.

Culms erect and slender; *sheaths* slightly shorter than the internodes, glabrous; *blades* glaucous, scabrous, villous-hirsute above; *spikes* glaucous, sometimes slightly nodding, usually several rudimentary spikelets at the base, peduncles slender, exserted 4–15 cm.; *rachis-internodes* 4–5 mm. long, hispid-ciliate; *spikelets* in pairs 3- to 5-flowered, spreading; *glumes* lanceolate, somewhat twisted, broadened above the base, scabrous on veins and margins above the terete, indurated, slightly bowed-out, pale yellow base, with 2–5 strong nerves, awns 4–10 mm. long; *lemmas* minutely scabrous along veins near the apex, 5 veins distinct only near the apex, awns straight and scabrous; *paleas* blunt at apex, ciliate-hirsute near the apex; found in both flowering and fruiting stages in July.

Dimensions of various organs (all measurements based on 4 specimens):

Culm-length	70–90 cm.	Lemma-length	14–25 mm.
Culm-width (approx.)	0.2 cm.	Length of lemma-body	7–8.5 mm.
Blade-length	13–20 cm.	Palea-length	6–7 mm.
Blade-width	0.7–1.0 cm.	Anther-length	2.8 mm.
Spike-length	7.5–15 cm.	Grain-length	5.0–5.4 mm.
Glume-length	14–23 mm.	Grain-width	1.7–1.8 mm.
Glume-width	0.8–1.4 mm.		

This variety has not been previously reported from Minnesota. It is apparently rare and has been collected in only three localities in the southern part of the state. It probably occurs only in alkali soil. Lake Shetek is definitely an alkali lake and French Lake is probably one, being in the alkali lake and pond area. The soil around Jordan is a gray glacial till derived from the western (alkali) part of the state.

We suspect that the Minnesota plant is not genetically related to the var. *halophilus* of the East but rather represents a parallel response to similar ecological conditions. Further study may well show that it is not worthy of varietal rank.

Specimens examined: MINNESOTA: near Jordan, July, 1891, *Ballard 389* (2 sheets, somewhat intermediate with typical *E. virginicus*); Bull's Bluff, Lake Shetek, Murray Co., July 5, 1902, *Skinner 303 1/2*; shore of French Lake, Windom, Cottonwood Co., July 12, 1938, *Moyle 3142*.

2. Elymus villosus

2a. E. villosus Muhl. ex Willd. (typical). *E. striatus* of many American authors, not Willd.—*Culms* densely tufted, erect or ascending; *sheaths* glabrous except for villous hairs on the inrolled margins, lower sheaths often glaucous and densely villous;

blades flat, often glaucous, thin, scabrous on the margins and on the lower surface, villous on the upper surface; *spikes* long- or short-exserted or partially included, several rudimentary spikelets at the base represented by coarse hairs, rudimentary or empty glumes; *rachis-internodes* flattened, concave above the middle next to the spikelets, slightly winged above the middle, often a blunt ridge down the length of back, hirsute on the margins; *spikelets* in pairs, usually 2-flowered (upper one sterile); *glumes* stiff, subsetaceous and tapering into their awns, usually with 3 strong nerves, terete and very slightly bowed out at the base, entirely villous or villous at the base and hirsute above, awns straight, rigid, scabrous; *lemmas* rounded on the back, villous to hispid on upper part of the body and hispid to glabrate on lower part, 5 very weak nerves visible only near the apex, awns straight, scabrous; *paleas* obtuse and ciliate near the apex, ciliate on the margins of the upper half, a few appressed soft hairs on the face.

Dimensions of various organs (measurements of floral organs based on 8 specimens):

Culm-length	40–60 cm.	Lemma-length	23–34 mm.
Culm-width (approx.)	0.15 cm.	Length of lemma-body	6–7.5 mm.
Blade-length	10–20 cm.	Palea-length	5.5–6.5 mm.
Blade-width	0.6–0.8 cm.	Anther-length	1.6–4.0 mm.
Spike-length	6–13 cm.	Grain-length	5–6 mm.
Glume-length	13–23 mm.	Grain-width	1.5–1.6 mm.
Glume-width	0.3–0.7 mm.		

This species has been collected along lake-shores and rivers and also in dry woods, meadows and on hillsides. It is generally distributed in the central and southern parts of the state.

2b. E. VILLOSUS f. ARKANSANUS (Scribn. & Ball) Fernald.—*E. arkansanus* Scribn. & Ball. This form is distinguished from the typical element of the species by the less pronounced pubescence of glumes and lemmas. It has scabrous *glumes* (nerves and margins) and sometimes in addition has a few short stiff hairs near the base; the *lemmas* are short-hispid to glabrate on upper part of the body and puberulent to glabrate on lower part. In no other morphologic feature could further distinction of the form be established. Observations are based on three specimens collected in Minnesota (*Sheldon 842*, *976½* and *Moyle 2770*) and other specimens from bordering states, Iowa and North and South Dakota.

A study of a suite of out-of-state material indicates that the length and the amount of pubescence on the glumes vary independently of each other. The nature of the pubescence is consistent only in that the longest hairs are always at the apex.

3. Elymus canadensis

3. E. CANADENSIS L. *E. philadelphicus* L.; *E. glaucifolius* Muhl. ex Willd., fragment of TYPE in Gray Herb.; *E. canadensis* var. *pendulus* Eaton & Wright; *E. canadensis* f. *crescendus* Ramaley, TYPE in Herb. UM, seen; *E. robustus* Scribn. & Smith, TYPE in U. S. National Herb., ISOTYPE in Gray Herb., fragment of TYPE seen; *E. brachystachys* Scribn. & Ball, ISOPARATYPE, *Rydberg 1174*, in Herb. UM, seen; *E. canadensis villosus* Bates, ISOTYPE in Herb. UM, seen; *E. robustus* var. *vestitus* Wiegand.

The numerous combinations based on the above basonyms have been purposely omitted.

Culms erect, tufted; *sheaths* glabrous or rarely villous; *blades* flat, long-tapering, narrowed toward the base, usually scabrous on both surfaces but less markedly so on the upper surface; *spikes* long- or short-exserted or sometimes partially included, definitely arching to rather erect, occasionally glaucous in varying degrees, often with one to several rudimentary spikelets below the inflorescence proper, the several lowest internodes of the rachis elongated with spikelets few-flowered, variable in denseness of inflorescence; *rachis internodes* slightly winged and sparsely hispid on margins above the middle; *spikelets* commonly 2 or 3 abreast, 3- to 5-flowered with uppermost floret often sterile; *glumes* occasionally glaucous in varying degrees, 3-, 5-, or 6-nerved almost to the narrowed base, nerves scabrous to hirsute, margins narrowly hyaline and microscopically serrulate; *lemmas* practically glabrate to scabrous, hispid, or villous, varying in degree from dense to very sparse, 5 nerves prominent above the middle of the body, awns scabrous and spreading, many curved or recurved especially in fruit (straight only before flowering); *paleas* blunt at the apex, ciliate-hispid at the apex and along upper margins of the keels, scattered and appressed hairs on the face.

Dimensions of various organs (measurements for floral organs based on 12 specimens):

Culm-length	70–120 cm.	Glume-length	14–35 mm.
Culm-width (approx.)	0.35–0.5 cm.	Glume-width	0.8–1.2 mm.
Blade-length	17–40 cm.	Lemma-length	32–53 mm.
Blade-width	0.5–1.5 cm.	Length of lemma-body	11–17 mm.
Spike-length	11–30 cm.	Palea-length	9.8–13 mm.
Length of rachis-internode (middle of spike)	6–7 mm.	Anther-length	3 mm.
		Grain-length	5–7 mm.
Length of rachis-internode (base of spike)	10–15 mm.	Grain-width	1.4–1.6 mm.

Material identifiable with each of the described entities cited in synonymy occurs in Minnesota. In the material we have seen,

however, the characters used to separate the entities vary considerably so that it is very difficult to draw lines of separation. In addition, no two characters correlate to any reasonable degree. About half of the Minnesota material is glaucous and the other half is green or very slightly glaucous. The spikes vary from rather erect to mostly definitely arching. Most spikes are exserted but some are included at the base. The spikes also vary from stout to slender and from long to short, without correlation between the two sets of characters. Any type of spike may be loosely or densely flowered. The sheaths and upper leaf-surfaces are rarely villous, commonly glabrous. The lemmas vary from glabrous to villous with all intermediate conditions represented; the abundance of hairs also varies greatly and without reference to their individual lengths. The variation with the villous sheaths and upper leaf-surfaces (*E. canadensis villosus* Bates) is more strongly marked than any of the others.

Taking seven pairs of the characters listed above (e. g., plant green vs. glaucous, spike erect vs. arching, etc.), there would be one hundred and twenty-eight possible combinations of characters. Of these, forty combinations occur in the fifty-eight sheets of *E. canadensis* examined.

Because of this independent behavior of the characters, we are unable to recognize any varieties within the species, and, although some variations may be worthy of the rank of form, we feel that the recognition of subspecific categories should await a broad study of all North American material.

Material very similar to ISOTYPES of *E. Wiegandii* Fernald and *E. Wiegandii* f. *calvescens* Fernald (*Fernald 197* and *Fernald & Strong in 1896*, respectively) has been collected in Minnesota: *Butters & Abbe 1024*, *E. & H. Alsapa in 1940*, and *Nielsen 1790*. We are unable to separate this material from *E. canadensis*. In their relatively narrow glumes, these specimens approach some specimens of the *E. canadensis* × *Hystrix patula* complex from which they may be separated by the equal and narrowly lanceolate glumes, rather than unequal or subsetaceous glumes.

E. canadensis is widely distributed throughout the state on lake-shores, river-banks, borders of woodlands along roadsides and railroads and elsewhere in light soils.

4. Elymus canadensis × Hystrix patula

4. E. canadensis L. × H. patula Moench. *E. diversiglumis* Scribn. & Ball, in part. *E. interruptus* of recent authors, in part, not Buckley.—*Culms* erect, rather stout; *sheaths* glabrous; *blades* flat, more or less scabrous on both surfaces, usually with scattered soft hairs on the upper surface; *spikes* loose, flexuous, mostly well exserted, usually with several rudimentary spikelets at the base, one specimen branched near the base; *rachis-internodes* slender, about 7 mm. long near the middle of the spike, much elongated near the base of the spike, narrowly winged and hirsute on margins above the middle, glabrous on the back; *spikelets* in pairs, somewhat spreading, deciduous, 3- to 5-flowered with uppermost floret usually empty; *glumes* one or more at a node, usually much reduced, spreading, scabrous to hispidulous on veins and margin, slightly bowed out and indurated at the base, setaceous to narrowly lanceolate; *lemmas* rounded on the back, hirsute to villous, 5 nerves distinct toward the apex, awns scabrous, curved; *paleas* prominently keeled at the sides, apex blunt, ciliate-hirsute along the rigid keels and at the apex, scattered and appressed hairs on the face near the apex.

Dimensions of various organs (measurements of floral organs based on 5 specimens):

Culm-length	85–125 cm.	Lemma-length	39–50 mm.
Culm-width (approx.)	0.3 cm.	Length of lemma-body	9.8–11 mm.
Blade-length	15–30 cm.	Palea-length	8.4–9.8 mm.
Blade-width	0.7–1.1 cm.	Anther-length	3.6–4.0 mm.
Spike-length	13–24 cm.	Grain-length	2.8–8.0 mm.
Glume-length	6–20 mm.	often much reduced in occasional glumes.	
Glume-width	0.3–0.4 mm.		

The following table shows the intermediate nature of the proposed hybrid:

	Elymus canadensis	×	*Hystrix patula*
Lemma-awns	Curved-divergent, usually recurved	Curved-divergent, often recurved	Usually straight, not recurved
Glumes, shape	Narrowly to long-lanceolate	Setaceous to narrowly lanceolate, mostly subsetaceous	Setaceous if present
Glumes, length	14–35 mm., usually 25–30 mm.	6–20 mm., mostly 10–15 mm.	0–18 mm., mostly less than 5 mm.
Glumes, equality	Equal or essentially so	Unequal	Very unequal
Grains	Present	Often lacking	Present

The specimens collected in Minnesota and previously referred to *E. diversiglumis* and more recently to *E. interruptus* are unique

in the variable lengths of their glumes. An unusual amount of variation is often exhibited within a single spike. An intensive study has convinced us that this material represents hybrids of the proposed parent species. Unlike recent hybrids in the *Hordeae* studied by Stebbins and co-workers[3], this one is apparently sometimes fertile, as indicated by the fact that rarely grains are developed. Such a complete series of intergrades exists between the two parents that it is likely also that there occurs considerable backcrossing of the presumed F_1 hybrids to the putative parents. The true nature of the proposed hybrid will, of course, await cytological and genetical studies.

The following selected series illustrates the transition between *Hystrix patula* and *Elymus canadensis* in the characters of the glumes: *Lakela 4183*, *H. patula*, has the glumes obsolete or rudimentary, only one of a pair developed to any size; *Sheldon 459*, *H. patula*, has the glumes obsolete to 8 mm. long with only one of a pair well developed; *Sandberg* (UM Herb. 67146), *H. patula*, has the glumes obsolete to 18 mm. long, those of a spikelet very unequal; *Bergman 2066* (N. Dakota), *Skinner & MacMillan 107*, *Ballard 578* and *Campbell 130*, *E. canadensis* × *H. patula*, have the glumes varying from obsolete to 8 mm. long and very unequal to mostly 4–15 mm. long and unequal. In all of the above specimens the glumes are setaceous. *Skinner & MacMillan 267* and *Grant 3091*, *E. canadensis* × *H. patula*, and *Rosendahl 4916* (Wis.), very close to *E. canadensis*, have the glumes subsetaceous to narrowly lanceolate, 6–20 mm. long and not very unequal; *Aiton in 1889* (UM Herb. 64790), *E. canadensis*, has the glumes equal, long-lanceolate and about 30 mm. long.

Specimens that are close to *E. canadensis* can usually be separated by their subsetaceous, relatively short glumes that are unequal in at least some of the spikelets. Those close to *Hystrix patula* can be separated by their relatively well developed glumes and the frequently recurved lemma awns.

The type specimens of *E. diversiglumis* (Wyoming) and *E. interruptus* (Texas) are from areas outside of the range of *Hystrix patula*. The status and identity of those two species is left for consideration in a broader study.

Specimens examined: NORTH DAKOTA: Walhalla, *Bergman 2066*. SOUTH DAKOTA: Big Stone City, *J. W. Moore*

[3] Stebbins, G. L., Jr., J. I. Valencia and R. M. Valencia. Artificial and Natural Hybrids in the Gramineae, Tribe *Hordeae*. I. *Elymus*, *Sitanion* and *Agropyron*. Amer. Journ. Bot. 33: 338–351; II. *Agropyron*, *Elymus* and *Hordeum*. 579–586. 1946.

528. MINNESOTA: Crookston, *Skinner & MacMillan 107, 267;* Crystal Lake, *Ballard 578;* Rockville, *Campbell 130;* Vining, *Moore & Jacobs 14777;* Black Hoof, *Moore & Butters 13472;* Itasca Park, *Grant 2914, 3091, 3138;* Lanesboro, *Moyle 3959;* St. Anthony Park (St. Paul), *Wheeler 1224;* Itasca Park, *Rosendahl 5917, 5922;* Gull Lake, *A. P. Anderson in 1893;* Nerstrand Woods, *Linnaean Club 210;* Fort Snelling, *Nielsen 1785.* WISCONSIN: St. Croix Co. (north of Stillwater, Minn.), *Rosendahl 4916.*

This hybrid is rather widely distributed from the southeastern corner of the state to nearly the northwest corner, but has not been collected in either the southwestern or northeastern parts of Minnesota. It occurs entirely within the range of *Hystrix patula* in the state.

5. "Elymus Macounii"

5. Agropyron trachycaulum (Link) Malte var. typicum Fernald × Hordeum jubatum L. *Elymus Macounii* Vasey.

The "species" long passing as *Elymus Macounii* has recently been shown[4] to represent hybrids of various species of *Agropyron* and *Hordeum.* The material from Minnesota is all sterile, lacking grains, and it fits into such a hybrid interpretation. The parents of the Minnesota material (*Wheeler 1254, Skinner 223, Ballard 2570* and *Moyle 2609*) are proposed as *A. trachycaulum* var. *typicum* and *H. jubatum.* The critical characters of the two parents and the hybrid are presented in the following table:

Hordeum jubatum	×	*Agropyron trachycaulum var. typicum*
Rachis readily disarticulating	Rachis tardily and incompletely disarticulating	Rachis tardily and weakly, if at all, disarticulating
Spikelets in 3's	Spikelets solitary or in pairs	Spikelets solitary
Spikelets 1-flowered	Spikelets 2–4-flowered	Spikelets 3–4-flowered
Spikelets spreading	Spikelets appressed	Spikelets appressed
Glume-awns 4–8 cm. long	Glume-awns 0.5–1 cm. long	Glumes awnless or nearly so
Grains present	Grains absent	Grains present

6. Excluded Species: Elymus cinereus

6. E. cinereus Scribn. & Merr. *E. condensatus* of recent authors, in part, not Presl.

[4] Stebbins, G. L., Jr., J. I. Valencia and R. M. Valencia. Artificial and Natural Hybrids in the Gramineae, tribe *Hordeae* II. *Agropyron, Elymus* and *Hordeum.* Amer. Journ. Bot. 33: 580. 1946.

The awnless or scarcely awned lemmas separate this species from *E. canadensis* and *E. villosus* and the setaceous or subsetaceous glumes separate it from *E. virginicus.*

This species is known to Minnesota only by a single specimen in the United States National Herbarium (Fort Snelling, Minnesota, August 3, 1890, *E. A. Mearns 4*). The identification has been confirmed by Dr. J. R. Swallen who has also kindly sent us a copy of the label. A mixture of labels may have been involved (Vasey's identification was *E. canadensis* !), but assuming not, then it seems almost certain that this species no longer grows at Fort Snelling. Local botanists have never collected the species there in spite of frequent trips to the area, even in the 1890's. Intensive development of the area during two wars has eradicated much of the original flora. Inasmuch as the Minnesota "station" is an isolated eastern occurrence, there is the possibility that it was an ephemeral adventive from the West.

Under the circumstances, we feel that it is best to exclude this species from the state flora until such a time as its occurrence may be more satisfactorily established.

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DISTRIBUTIONAL NOTES AND SOME MINOR FORMS FROM OKLAHOMA

U. T. Waterfall

The following notes are concerned primarily with plants collected by the author in 1944 and 1945, mostly in south-central Oklahoma in the Arbuckle Mountains and vicinity. This area has often been botanically investigated by classes, and other parties, but has seldom been reported on as a phytogeographic area. Ernest J. Palmer spent parts of two days collecting there in 1934 while on a more extensive botanizing trip which included other parts of the state. In the Arbuckles he found and reported several species which he considered to be characteristic of the limestone areas of the Edwards Plateau in Texas. He suggested that the Arbucklean flora might constitute a northeastern

outpost of the flora of the Edwards Plateau[1]. Milton Hopkins also mentions similarities in the flora of the two regions in his discussion of the range of *Juniperus Ashei* (*J. mexicana*)[2]. Additional evidence concerning the southwestern affinities of the flora of the xeric slopes of the Arbuckles will be presented here.

The vegetation of the Arbuckle region varies from the heavily forested areas along the Washita River and some of the larger creeks (where such mesic species as *Sanicula gregaria*, *Taenidia integerrima*, *Zizia aurea* and *Dasistoma macrophylla* may be found), through mesic grassland dominated principally by *Andropogon scoparius*, to xeric slopes dominated by species listed later.

A contrast in vegetation is often found in the grassland on the north and south sides of the low limestone hills which run in a general east-west direction in the central and southern parts of the Arbuckles. The creek-bottoms and valleys between the hills are often wooded, as sometimes are the arroyos running up the hillsides. The limestone plateau which comprises the top of the Arbuckles is grass-covered, as usually are the hillsides, especially in the Arbuckle limestone. On the north sides of the hills, as on the plateau, the grassland is usually mesic in character, being composed primarily of *Andropogon scoparius* with varying amounts of *Andropogon Gerardi*, *Sorghastrum nutans* and *Panicum virgatum* growing where extra water is available, and smaller amounts of *Bouteloua curtipendula*, and other species with a lower water requirement, growing on the less favored sites. The southern slopes of the hills are often characterized by a more xeric grassland vegetation. The principal species are: *Bouteloua hirsuta*, *Bouteloua curtipendula*, *B. rigidiseta*, *Triodia elongata*, *Triodia pilosa* and *Panicum Hallii*. The latter may be fairly abundant locally. However, even on the south slopes, where faults in the rock strata, or separation of up-ended layers, have permitted the accumulation of a deep soil and the concentration of run-off water, *Andropogon scoparius* again becomes dominant. Even in the fall and winter the difference between the kinds of vegetation on the two slopes can be recognized from a distance

[1] Palmer, E. J., *Notes on some plants of Oklahoma*. Journ. Arn. Arb. **15**: 132–134. 1934.

[2] Hopkins, Milton, *Notes from the Herbarium of the University of Oklahoma*—I, Rhodora **40**: 425–429. 1938.

by the contrasting coloration. The grasses on the northern sides, predominantly *Andropogon scoparius*, cure to a brownish or red-brown color. The southern slopes are a lighter color as many of the species growing there dry to a light, yellowish or grayish color. In extreme cases it is almost as if the two sides of the hill were separated several hundred miles geographically and climatically. This seems to be due to the probability that the available water supply on these sites is critically near the minimum amount needed for the growth of *Andropogon scoparius*. Consequently, the increased evaporation on the south-facing slopes reduces the amount of available water below the minimum required for the perpetuation of *Andropogon scoparius*. More xeric species, having lower water requirements, are consequently found on these sites. This is not to be taken as precluding the probability that the distribution of certain species may be correlated primarily with the presence of limestone, or other different substrates of immature soils. Thus the xeric vegetation on limestone hills may differ from that on granite, climatic conditions being similar.

An example of several species southwestern in affinities was found growing on an igneous canyon-wall along a creek 8 miles west and 3 miles south of Davis, Murray County. Here were collected: *Cheilanthes Eatonii*, *Pellaea Wrightiana*, *Leptochloa dubia*, *Abutilon incanum* and *Galium texense*.

Some of the xeric species found on limestone include: *Triodia pilosa*, *Triodia elongata*, *Bouteloua rigidiseta*, *Panicum Hallii*, *Sida procumbens* and *Galium texense*.

Sphenopholis obtusata (Michx.) Scribn., var. lobata (Trin.) Scribn. forma **purpurascens** (Vasey ex Rydb. and Shear) comb. et stat. nov. *Eatonia obtusata*, var. *purpurascens* Vasey ex Rydb. and Shear, U. S. Dept. of Agri., Div. of Agrostology, Bull. **5**: 30. 1897. Plants similar to *S. obtusata*, var. *lobata*, but differing primarily in having the glumes and upper parts of the lemmas colored dark purple, were found in a creek-bottom prairie, 3 miles east and 3 north of Sulphur, Murray County, on May 24, 1946. They were collected as *Waterfall* No. 6486.

Dr. Edward Palmer collected the type of var. *purpurascens*[1] "in the Indian Territory, chiefly on the False Washita, between

[1] The author is grateful to Dr. E. P. Killip, Head Curator of the Department of Botany, Smithsonian Institution, United States National Museum, Washington, D. C., for the loan of the type.

Fort Cobb and Fort Arbuckle, 1868". It is numbered 404, and designated by Vasey as *Eatonia obtusata*, var. *purpurascens*. Rydberg and Shear validated this herbarium name as "a form with purplish panicles". They also cited their numbers 252, 252½ and 2002 from Nebraska, and *Kearney* 271 from the same state, as representing var. *purpurascens*.

Since the principal differentiating characteristic seems to be the minor one of glume and lemma coloration, the author believes these plants should receive only formal designation, whether or not their occurrence proves to be sporadic throughout the entire range of the variety. It might also be noted that some of our specimens referable to var. *lobata* on the basis of having short panicles with appressed, rounded branches do not have puberulent sheaths. If the panicle characteristics, variable though they are, be accorded more taxonomic significance than the sheath characteristic, then it would appear that var. *lobata* should be considered as having sheaths varying from glabrous to pubescent. A second possibility is that plants with glabrous sheaths merely represent a merging with the typical variety.

Sphenopholis obtusata, var. pubescens (Scribn. and Merr.) Scribn. In checking the material of *Sphenopholis obtusata* from our state, there were found two sheets that agree with the characteristics of var. *pubescens* as set forth by Fernald[1], and also by Lamson-Scribner[2]. These sheets are: *Milton Hopkins* 1696, dry rocky woods . . . 9 miles northwest of Wilburton, Latimer County, May 7, 1937; *Elbert Little* 1083, Muskogee County, May 15, 1927. This variety appears to be an addition to our state flora.

Sporobolus pyramidatus (Lam.) Hitchc. This species is a rarity in the Arbuckles where it grows on saline soil, as did *Waterfall* 6074, taken from saline sand in the Secondary Wilcox Formation, about 3 miles north of Springer, Carter County. An abundant associate was *Distichlis stricta*, another indicator of salinity. The latter species is common farther west and northwest in the state.

Stipa leucotricha Trin. and Rupr. is locally abundant in the Arbuckle Mountain area and southward through the tight, limestone-derived "blacklands". It is often associated with *Buchloe dactyloides*, and, when abundant in this region, should

[1] Fernald, M. L., *Another Century of Additions to the Flora of Virginia*, Rhodora **43**: 533. 1941.

[2] Lamson-Scribner, F., *The Genus Sphenopholis*. Rhodora **8**: 143. 1906.

probably be considered as an indicator of overgrazing of about the same significance as the latter species.

LESQUERELLA OVALIFOLIA Rydb., var. ALBA Goodman. This white-flowered *Lesquerella* is locally abundant in the Arbuckles, sometimes coloring hills white in the early spring. It is usually found on thin, shallow soil on limestone hills. In near-climax condition it grows with such grasses as *Bouteloua curtipendula*, *Bouteloua hirsuta* and *Triodia elongata;* under overgrazing the *Lesquerella* increases in abundance, as do such species as *Triodia pilosa.*

In the spring of 1947, the var. *alba* was first collected from the Wichita Mountains (*Goodman* and *Waterfall* 5694). Previously it had been known only from the Arbuckles where it was discovered. Peculiarly enough, in the Arbuckles it has been found only on limestone, not on granite, while in the Wichitas it grows on granitic soils.

STILLINGIA TEXANA Johnston, var. **latifolia,** var. nov., a varietate typica differt foliis latioribus et crenatis.

In July 1946, the author collected from limestone soil in the Arbuckle Mountains a *Stillingia* apparently referable to *Stillingia texana* by virtue of the small fruits (ca. 7 mm. in diameter). However, the leaf-width was broader by two or three times than the leaf-width usually associated with *S. texana,* and the margins were crenate. Furthermore, the collection is considerably north of known records for the species, and thus in an area where variation might be expected.

Material of *S. texana* (including *S. sylvatica,* var. *linearifolia* Torr., *S. linearifolia* (Torr.) Small, not Wats., and *S. angustifolia* Engelm. as applied to the early Texas collections, not the Florida material) was borrowed from the Gray Herbarium of Harvard University, the herbaria of the Missouri Botanical Garden, University of Texas and Southern Methodist University.[1] A study of this material shows that *S. texana* commonly ranges from north-central Texas, as shown by numerous collections from near Dallas and Fort Worth, westward to Shakelford County (*Waterfall* 4345), then southwest to Taylor and Coke Counties. From the Fort Worth-Dallas area south and southwest to the Austin-Fredericksburg-San Antonio region the species often has been collected. Following the description of

[1] The author is indebted to the curators of the herbaria mentioned for the loan of material needed in this study.

the type Torrey[1] cites the following distribution: "Ravines on the San Pedro River and on limestone rocks higher up on the Rio Grande". It has been collected in Coahuila, Mexico: *Marsh* 80, Musquiz, Coahuila, 1935; *Wynd* and *Mueller* 225, Hacienda Mariposa, ravine near Santa Anna, June 22, 1936; *Wynd*, Hacienda San Rafael, about 10 miles southwest of Hacienda Mariposa along Sabinas Creek, Aug. 18, 1937. The labels on several collections state that the species was found on limestone soil, or limestone outcrops. The author's collections in north-central Texas, as well as the present one, are from such sites.

The relative narrowness of the leaves seems to be a fairly constant vegetative characteristic of the typical variety, Stillingia texana Johnston, var. **typica** nom. nov. (*S. sylvatica*, var. *linearifolia* Torr., Botany of the Mexican Boundary, 201. 1859). A number of measurements indicate that the majority of the leaves are from 10 to 15 times longer than wide. Contrastingly, the leaves of var. *latifolia* are 5 to 7 times longer than wide. This leaf-width approaches that of *S. sylvatica*, var. *salicifolia*. From the latter variety *S. texana*, var. *latifolia* may be distinguished by the size of the fruits which average about 7–8 mm. in diameter and about 6–7 mm. in height in both var. *typica* and var. *latifolia*, as contrasted with a diameter of about 14–15 mm. and a height of 12–14 mm. in *S. sylvatica*, var. *salicifolia*. The expanded upper part of the gynophore averages ca. 6 mm. in width in *S. texana*, and ca. 10 mm. in width in *S. sylvatica*.

The leaf-margins of *S. texana*, var. *typica* are often serrulate, the apices of the teeth being tipped with prominent conical glands. This characteristic is somewhat variable. The teeth may become more and more rounded, and the apical glands nearer and nearer the sinuses until the margins are crenate with glands in, or approaching, the bases of the sinuses. The serrulate-glandular leaves are much more numerous on the examined specimens than the crenate-margined leaves.

The type of *Stillingia texana*, var. *latifolia* is in the Bebb Herbarium of the University of Oklahoma. It is: *Waterfall* 6523, limestone hillside in the Arbuckle Mountains, 5 miles west and 2½ south of Davis, Murray County, July 15, 1946. An isotype is in the Gray Herbarium.

[1] Torrey, John. Botany of the Mexican Boundary, 201. 1859.

SIDA PROCUMBENS Sw. This perennial, procumbent *Sida* of the southwest is found fairly frequently, but not in abundance, on xeric limestone sites in the Arbuckles. It is represented in our herbarium by the following, all from Murray County: *Waterfall* 6060, limestone hill, 1½ miles southeast of Big Canyon, June 20, 1945; *Waterfall* 6396, limestone near White Mound, Arbuckle Mountains. The following sheets, variously misidentified, belong here: *Ed Dale* 647, limestone hillside near Prices Falls, Aug. 15, 1942; *Becker, Kennedy* and *Waterfall* 5294, Viola limestone, Arbuckle Mountains; *Hopkins* 4765, Viola limestone, Arbuckle Mountains.

I find no record of the species in our flora, but it is possible that G. W. Stevens collected it, or had knowledge of an Oklahoma sheet. On p. 286 of his Manuscript Flora[1] he has this key:

> Plant erect, annual, with fine pubescence.....1. *Sida spinosa*
> Plant decumbent or prostrate, perennial,
> pubescence with spreading hairs.....2. *S.*

His species No. 2 is unnamed, but the plants at hand will readily key there.

OENOTHERA SPACHIANA T. & G. Plants referable to this species were collected as *Waterfall* 6461 from sand at the edge of post-oak—black-jack woods 4 miles west and 3 north of Sulphur, Murray County. The petals were yellow, drying to a pink color. In our herbarium are sheets from Latimer and Hughes Counties. Munz[2] lists collections from "Weoka" (Wewoka ?), Atoka and Mannsville. The present collection is from somewhat farther west than the above, and from an additional county.

LUDWIGIA NATANS Ell., var. ROTUNDATA (Griseb.) Fern. and Grisc. On Aug. 9, 1945, the author found this variety growing along a creek running through limestone hills, 1 mile east and 4 south of Hennepin, Murray County. It was collected as No. 6109. In our herbarium there are two sheets that may be referred to this variety. They are: *A. H. Vanfleet*, sin. num., muddy ditch near Rodgers, Aug. 6, 1905; and *Fred Barkley* 1447, Canadian River southwest of Norman, Cleveland County, July 13, 1937.

Fernald and Griscom[3] state that the range of var. *rotundata*

[1] Stevens, G. W. *The Flora of Oklahoma.* Unpublished MSS. Original deposited in the Widener Library of Harvard University. 1916.

[2] Munz, Philip A. *Studies in the Onagraceae X. The subgenus Kneiffia . . .* Bull. Torr. Bot. Club 64: 289–290. 1937.

[3] Fernald, M. L. and Ludlow Griscom, *Three Days of Botanizing in Southeastern Virginia.* RHODORA 37: 175. 1935.

includes ". . . Georgia and Florida to Texas". Munz[1] says ". . . Atlantic coast to Rocky Mountains". The first statement of range does not include our state; the latter is inclusive enough to do so. At any rate the above citation of specimens definitely includes the plant in our flora.

Centaurium Beyrichii (T. & G.) Robins., forma **albiflorum** forma nov., corollis albidis. Type: *Waterfall* 6529, limestone hillside, 2 miles east and 2 north of Sulphur, Murray County, July 21, 1946. The type is in the Bebb Herbarium of the University of Oklahoma. Isotypes are in the herbaria of Missouri Botanical Garden and the New York Botanical Garden. The typical, pink-flowered form of the species is found locally abundant on limestone slopes in the Arbuckles, but is not widely distributed. The white-flowered form is fairly abundant in the area from which it was collected.

Sabatia angularis (L.) Pursh, is occasionally found in wet soil along creeks running through prairies in the Arbuckles. The common species of our area, abundant on prairies, is *S. campestris.*

Sabatia campestris Nutt., forma albiflora D. M. Moore. The white-flowered form has previously been reported from Arkansas, the state from which it was described in 1941. It is fairly common on prairies in the Arbuckle region where it is found sporadically with the pink-flowered form.

Scutellaria Wrightii Gray, forma **alba,** forma nov., corollis albidis. Type: *Waterfall* 6455, limestone hillside in the Arbuckle Mountains, 8 miles west and 2 south of Davis, Murray County; type placed in the Bebb Herbarium of the University of Oklahoma. The white-flowered form is quite rare.

Galium texense Gray has been previously reported[2] from the Wichita Mountains in Oklahoma. *Waterfall* 6457, from igneous canyon-walls, 8 miles west and 3 south of Davis, extends the range known to us about 80 miles eastward within the state. It is another xeric species found here near its probable northeastern limit of range.

Artemisia annua L. Plants referable to this species were collected as *Waterfall* 6530 along the Washita River southwest of Daugherty, Murray County, August 5, 1946. I find no previous record of this weedy *Artemisia* within the state.

University of Oklahoma

[1] Munz, Philip A. *Studies in the Onagraceae XIII. The American Species of Ludwigia.* Bull. Torr. Bot. Club **71**: 156. 1944.

[2] Hopkins, Milton. *Notes from the Bebb Herbarium of the University of Oklahoma—II.* Rhodora **45**: 276–277. 1943.

SIDA IN OKLAHOMA.—U. T. Waterfall, in this issue of RHODORA, page 97, has identified the unnamed 2d species of *Sida* in G. W. Stevens' manuscript Flora of Oklahoma as *S. procumbens* Swartz, the first species being *S. spinosa* L. Two other species are known to occur in Oklahoma, *S. hederacea* (Dougl.) Torr. and *S. physocalyx* Gray (*S. hastata* St. Hil., 1827, non Willd., 1803).

Stemen and Myers' Oklahoma Flora[1] includes two species of the genus, *S. spinosa* and *S. hederacea*. Their illustration, fig. 286, p. 318, is taken from one first published in Gates' Wild Flowers in Kansas,[2] fig. 74, p. 169, and is entitled in both works "Round-leaved Sida", although the illustration shows a plant with obliquely ovate leaves with shallow broad irregular notches in the margins. The Kansas plant, known to me only from a collection by Hitchcock from Meade County, is very similar to the illustration, while the only Oklahoma specimen I have seen, *A. I. Ortenburger*, 10 July 1926, near Gate, Beaver County, has the more typical reniform leaves with crenate or serrate margins. Thus, the Kansas plant matches the illustration, although the name is inaccurate, while the Oklahoma plant fits the name but not the illustration.

The fourth species in the Oklahoma flora, *S. physocalyx*, is also known to me from a single collection, *G. W. Stevens* 403, 21 June 1913, roadside near Hollis, Harmon County, of which there are specimens in the Gray Herbarium and the United States National Herbarium. These bear the label name of "*S. hederacea* Torr." and are sterile. They are definitely referable to *S. physocalyx* by the presence of large fusiform woody roots and an indument on the stem, petioles and lower surfaces of the leaves composed of 4-rayed stellate hairs, the rays aligned with the axis of the particular organ, two pointed apically, the other two basally.—IAN D. CLEMENT, Gray Herbarium.

[1] STEMEN, T. R. & MYERS, W. S. Oklahoma Flora. Harlow Publ. Corp., Oklahoma City, 1937.

[2] GATES, FRANK C. Wild Flowers in Kansas, Report of the Kansas State Board of Agriculture for the quarter ending December 1932. State Printer, Topeka, 1933.

Rorippa: a Correction.—In Rhodora, xlii. 271 (1940) I took up for one of the common North American and Asiatic varieties of *Rorippa islandica* (Oeder) Borbas the name var. *microcarpa* (Regel) Fernald, based upon *Nasturtium palustre* DC., var. *microcarpum* Regel (1861). At that time I noted that there already existed a form of true *R. islandica: R. islandica,* forma *microcarpa,* erroneously ascribed to G. Beck by Thellung (1919) and based upon *R. palustris* β. *microcarpa* G. Beck (1892). I failed to note that by the International Rules my combination is invalid for, although Beck's varietal combination was later than Regel's, the transfer of it to formal rank under *R. islandica* by Thellung precludes the use of the same trivial for any other form or variety of the species. I am indebted to Dr. Stanley Jay Smith for directing my attention to this error. *R. islandica,* var. *microcarpa* (Regel) Fernald now, unfortunately, has to be called var. *Fernaldiana* Butters & Abbe in Rhodora, l. c. 28 (1940). The long, prostrate and repent plant, *R. islandica,* var. *microcarpa,* forma *reptabunda* Fernald in Rhodora, 1.35 (1948) stands as a form under var. *Fernaldiana,* since forms of a species retain their original epithets without regard to the varietal name with which they were first associated.—M. L. Fernald.

Rhodora Index; Request for Corrections.—A cumulative index to the first fifty volumes of Rhodora is being prepared. Any user of Rhodora who has noted errors in the indices to the various volumes will greatly aid in the enterprise by sending the corrections to the Editors.

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